

U.S. Patent Application No. 09/869,454
Amendment After Final dated October 17, 2003
Reply to Office Action dated June 17, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A fluoropolymer comprising a polymer reaction product of:

- a) at least one first alkylene co-monomer containing at least one fluorine atom;
- b) optionally at least one monomer selected from 1) at least one second alkylene containing at least one fluorine atom which is different from first alkylene co-monomer; 2) at least one alkyl alkenyl ether containing at least one fluorine atom; or 3) at least one aliphatic or cyclic ketone containing at least one fluorinated alpha-alpha position; and
- c) at least one sterically hindered alkenyl or alkenyl ether organo-silane co-monomer with or without at least one fluorine substituent, wherein a) and b), if present, are present in a combined amount of at least 80 mol%, wherein said sterically hindered alkenyl or alkenyl ether organo-silane co-monomer comprises at least one alkoxy group that is a branched alkyl, cycloalkyl, or a heterocyclic group with or without at least one fluorine substituent.

Claim 2 (original): The fluoropolymer of claim 1, wherein said reaction product is an free radical polymerization reaction product.

Claim 3 (previously presented): The fluoropolymer of claim 1, wherein said at least one alkylene co-monomer is present in an amount of from about 40 mol% to about 99.9 mol%.

Claim 4 (currently amended): A fluoropolymer comprising a polymer reaction product of:

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a) at least one first alkylene co-monomer containing at least one fluorine atom;

b) at least one monomer selected from 1) at least one second alkylene containing at least one fluorine atom which is different from first alkylene co-monomer; 2) at least one alkyl alkenyl ether containing at least one fluorine atom; or 3) at least one aliphatic or cyclic ketone containing at least one fluorinated alpha-alpha position; and

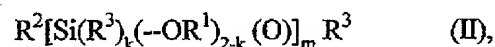
c) at least one sterically hindered alkenyl or alkenyl ether organo-silane co-monomer with or without at least one fluorine substituent, wherein a) and b), if present, are present in a combined amount of at least 80 mol%. The fluoropolymer of claim 1, wherein said at least one co-monomer b) is present in an amount of from about 0.1 mol% to about 50 mol%.

Claim 5 (previously presented): The fluoropolymer of claim 1, wherein said at least one sterically hindered alkenyl or alkenyl ether organo-silane co-monomer is present in an amount of from about 0.1 mol% to about 50 mol%.

Claim 6 (previously presented): The fluoropolymer of claim 1, wherein said at least one sterically hindered alkenyl or alkenyl ether organo-silane co-monomer is the formula:



wherein n is an integer of from 0 to 2, or of the formula:



wherein m is an integer of from about 2 to about 10; k is an integer of from 0 to 1; and R¹

represents at least one branched alkyl, cycloalkyl, or heterocyclic group with or without at least one

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fluorine substituent; R^2 represents at least one alkenyl or allyl containing group; R^3 represents at least one n-alkyl, branched alkyl, cycloalkyl, or heterocyclic group.

Claim 7 (original): The fluoropolymer of claim 6, wherein said R^3 further comprises at least one functional group.

Claim 8 (original): The fluoropolymer of claim 7, wherein said at least one functional group is at least one halogen, hydroxyl, nitrogen, amino, epoxy, carboxylic salt, ester, sulfur, oxygen, cyano, urea, amide, oxo, or combinations thereof.

Claim 9 (original): The fluoropolymer of claim 1, wherein said fluoropolymer is cross-linkable.

Claim 10 (original): The fluoropolymer of claim 7, wherein said fluoropolymer is cross-linkable.

Claim 11 (original): The fluoropolymer of claim 1, wherein said fluoropolymer further comprises at least one metal oxide, silane, or siloxane, or combinations thereof.

Claim 12 (original): The fluoropolymer of claim 11, wherein said at least one metal oxide, silane, or siloxane is reacted with a silane of said fluoropolymer.

Claim 13 (currently amended): A method of making the fluoropolymer of claim 1, comprising conducting a polymerization reaction in a buffered system of:

- a) at least one first alkylene co-monomer containing at least one fluorine atom;
- b) optionally at least one monomer selected from 1) at least one second alkylene containing at least one fluorine atom which is different from first alkylene co-monomer;

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2) at least one alkyl alkenyl ether containing at least one fluorine atom; or 3) at least one aliphatic or cyclic ketone containing at least one fluorinated alpha-alpha position; and

c) at least one sterically hindered alkenyl or alkenyl ether organo-silane co-monomer with or without at least one fluorine substituent for a sufficient time and at a sufficient pressure and temperature to form said fluoropolymer, wherein said sterically hindered alkenyl or alkenyl ether organo-silane co-monomer comprises at least one alkoxy group that is a branched alkyl, cycloalkyl, or a heterocyclic group with or without at least one fluorine substituent.

Claim 14 (original): The method of claim 13, wherein said polymerization is a free radical polymerization.

Claim 15 (original): The method of claim 13, wherein said polymerization is an emulsion polymerization.

Claim 16 (original): The method of claim 13, wherein said polymerization is in an aqueous media.

Claim 17 (original): The method of claim 13, wherein said polymerization occurs at a pH range of from about 4.5 to about 8.5.

Claim 18 (original): The method of claim 13, further comprising initially charging deionized water; di-sodium phosphate, tri-sodium phosphate, or both; and at least one fluorinated surfactant into a reactor and deoxygenating before introducing the co-monomers a), optionally b), and c).

Claim 19 (original): The method of claim 18, further comprising introducing an initiator emulsion and vinyl silane solution in a solvent to start a reaction after said initially charging step.

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Claim 20 (previously presented): The method of claim 13, further comprising continually feeding said co-monomers a), optionally b), and c) after said reaction begins.

Claim 21 (original): The method of claim 18, further comprising isolating said fluoropolymer.

Claim 22 (previously presented): The fluoropolymer of claim 1, further comprising non-fluorinated alkene, alkyl alkenyl ether, or alkenyl ester.